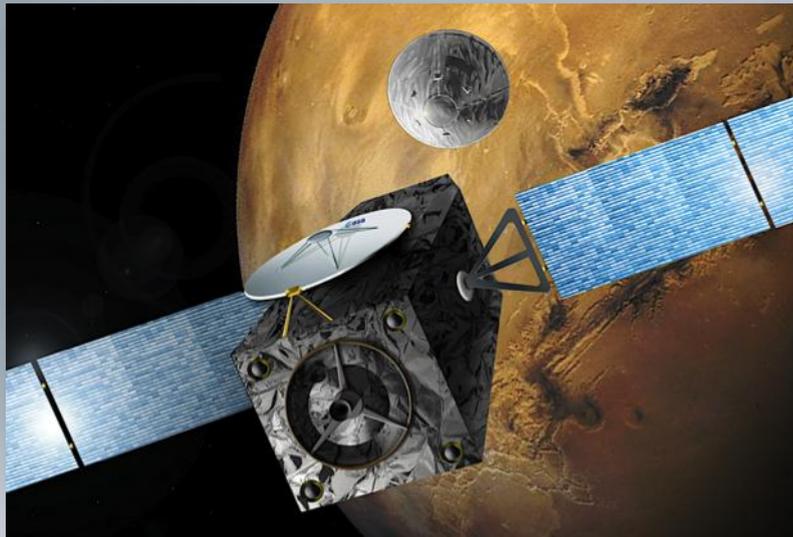


Joint Mars Programme Report



- ESA and NASA have agreed to embark on a joint Mars robotic exploration programme:
 - Initial missions have been defined for the 2016 and 2018 launch opportunities;
 - The joint programme's ultimate objective is an international Mars Sample Return mission.



2016

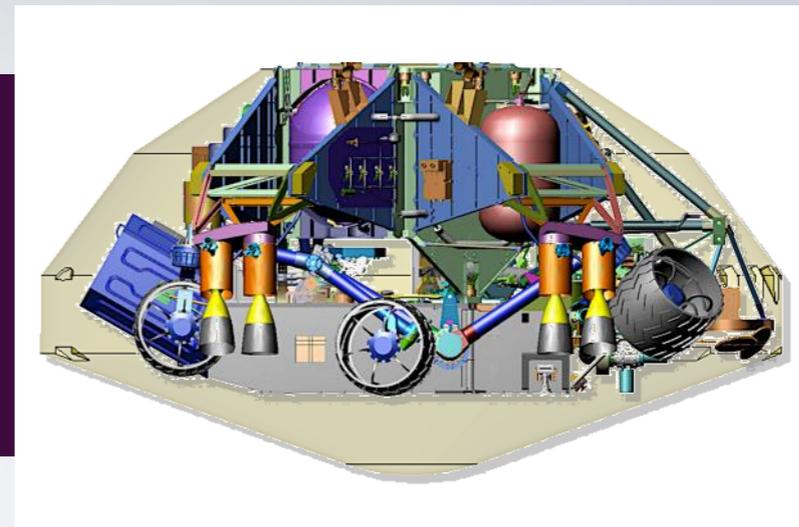
ESA-led mission

Launcher:	NASA – Atlas V 431
Orbiter:	ESA
Payload:	NASA-ESA
EDL Demo:	ESA

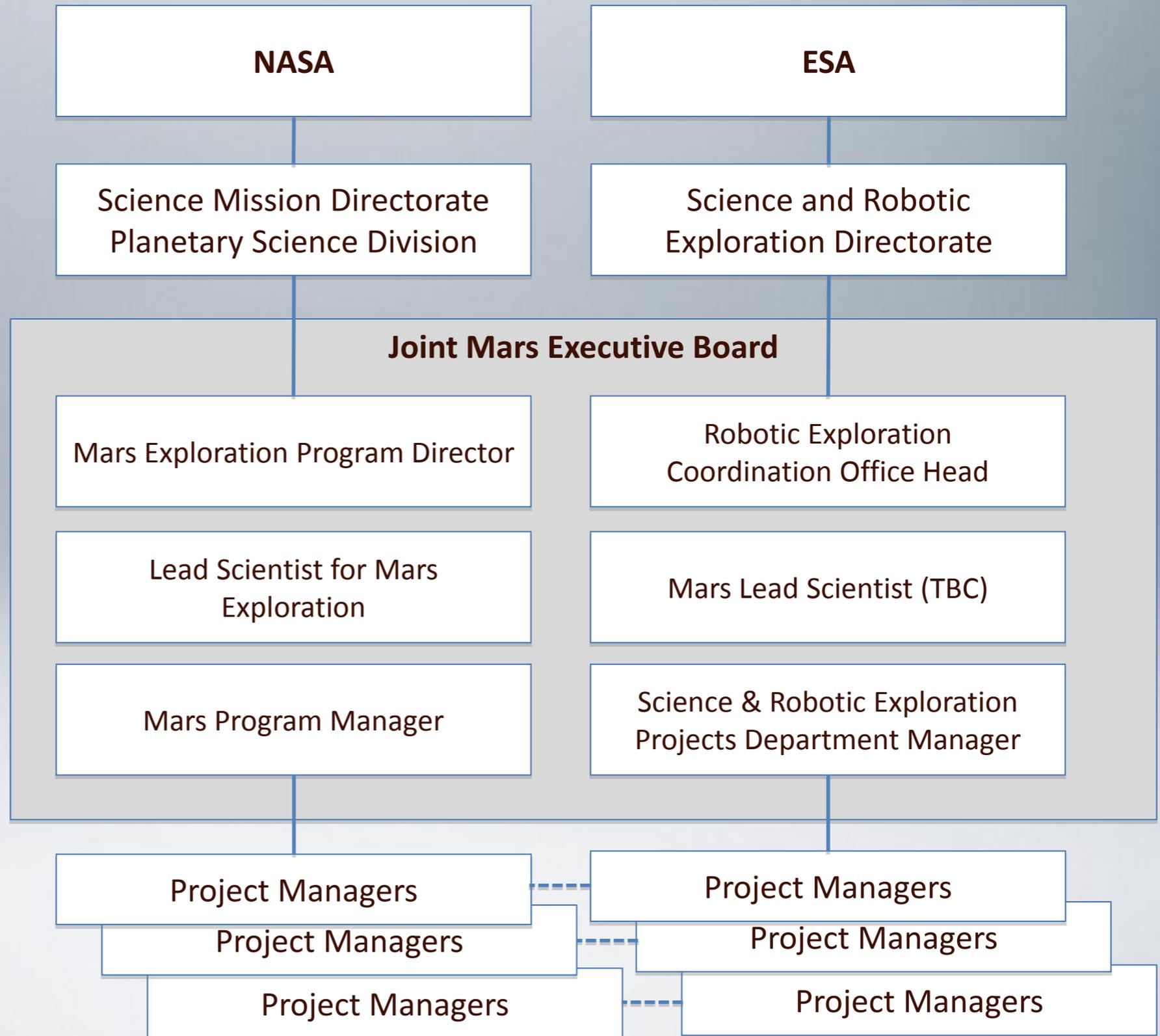
2018

NASA-led mission

Launcher:	NASA – Atlas V 541
Cruise & EDL:	NASA
Rover:	Joint, ESA-NASA



- **Joint Mars Executive Board (JMEB)** is the governing authority for the Joint Program
- JMEB defines mission formulation parameters and partnership arrangements/ agreements, forms Joint Engineering or Science Working Groups (JEWG/JSWG) and acts as an adjudication authority for issues not resolvable at Project level
- Project Managers report within their Agency's traditional chain-of-command as well as to the JMEB for issues affecting the both partners





At programme level (standing)

Joint Mars Executive Board (JMEB):

- Steering of the joint programme, guidance for formulating missions, requirements, and programme architecture;
- Oversight on implementation of missions.

Joint Mars Architecture Review Team (JMART):

- Independent review team to assess/critique programme level architecture, programmatic risk, national priorities, etc.

Project specific (ad-hoc)

Joint Engineering Working Group (JEWG):

- Advanced engineering planning group; standing organisation at ESTEC & JPL.
- Develop cooperative architecture options for shared mission responsibilities.
- Complete for 2016 ExoMars TGO, on-going for 2018 Rover mission, starting for Mars Sample Return.

Joint Instrument and other Study Groups:

- Established by the JMEB. For example, Joint Instrument Definition Team (JIDT) defined the investigation capabilities for the 2016 orbiter mission. Joint Science Working Group (JSWG) starting for 2018.
- 2R-iSAG two-rover science analysis group explored science cooperation possibilities for the 2018 rovers. E2E-iSAG to carry out an end-to-end MSR science analysis.

- Recent challenges:
 - Funding shortfall in NASA does not allow the implementation of the 2018 two-rover mission;
 - European industry price proposal exceeded financial target.

- March 2011 ESA-NASA Bi-Lateral meeting agreed to pursue 2018 joint single-rover mission concept

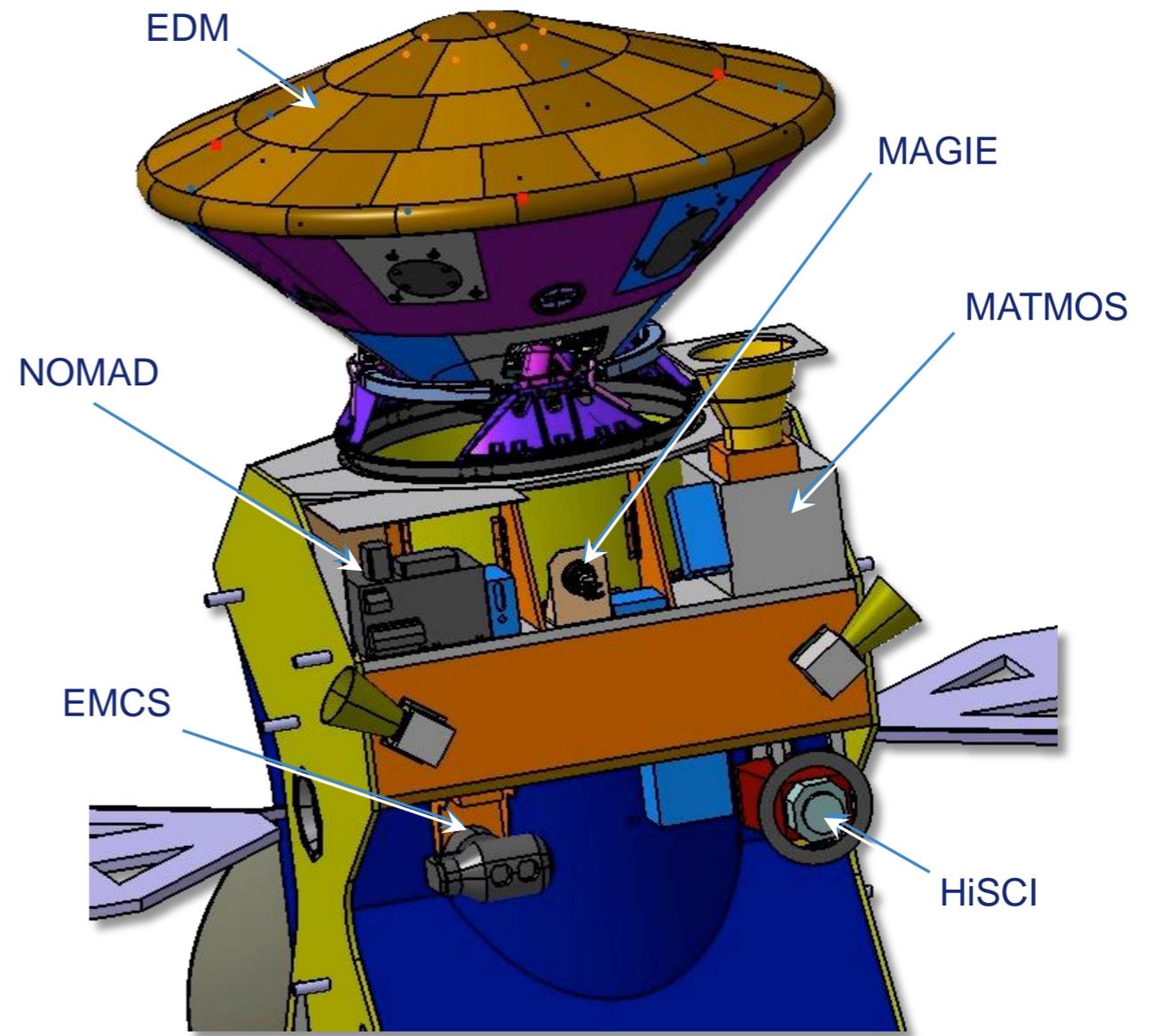
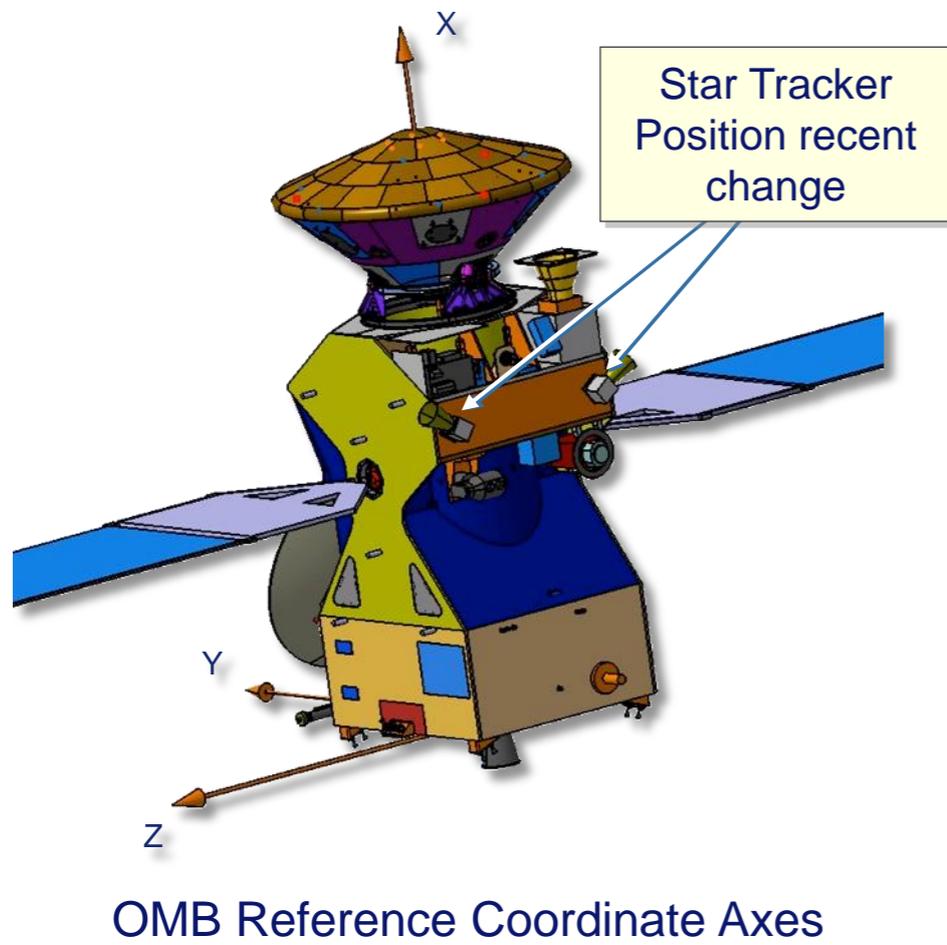
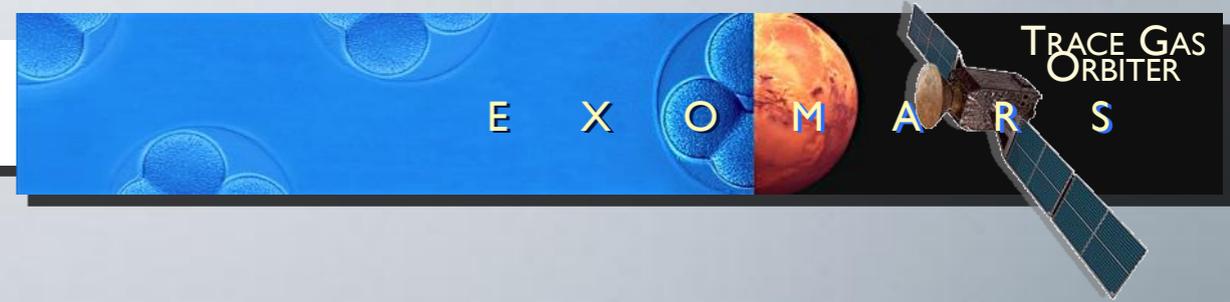
- Approved way forward at 26 May 2011 PB-HME preserves 2016 & 2018:
 - Following intense negotiations during April–June 2011, a price agreement was reached with Industry for the implementation of the 2016 ExoMars TGO mission;
 - The 2018 Joint Rover mission will proceed on the basis of a single rover;
 - Ring fence (set aside) ESA budget for covering industrial rover development;
 - NASA budget process underway in Congress for FY2012 and in NASA for FY2013 and beyond
 - The Joint Rover will pursue the search-for-life goals of ESA, and the first step Mars Sample Return goals of NASA and the US National Academy's Decadal Survey;
 - The 2018 mission is very cost constrained.
 - NASA has cost-capped its share of the 2018 mission

- 2016 ExoMars Trace Gas Orbiter mission:

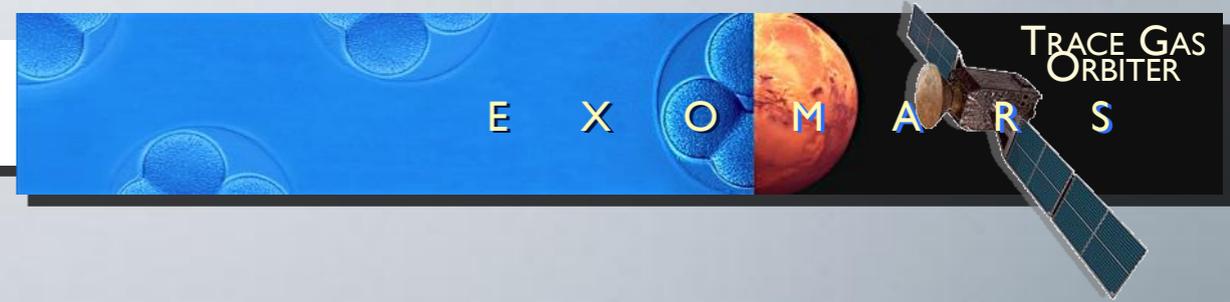
- Industrial Policy Committee (IPC) 29–30 June 2011
Seek funding for Phase C/D. Requires signed ESA-NASA commitment for both missions;
- Phase C/D kick-off 1 July 2011

- 2018 Joint Rover mission:

- Design study completion and proposal preparation Sep–Oct 2011
- Final agreement on contributions Nov 2011
- IPC Feb 2012
- Phase B/C/D kick-off (3-month Phase B) Apr 2012
- Phase C/D activities Jul 2012

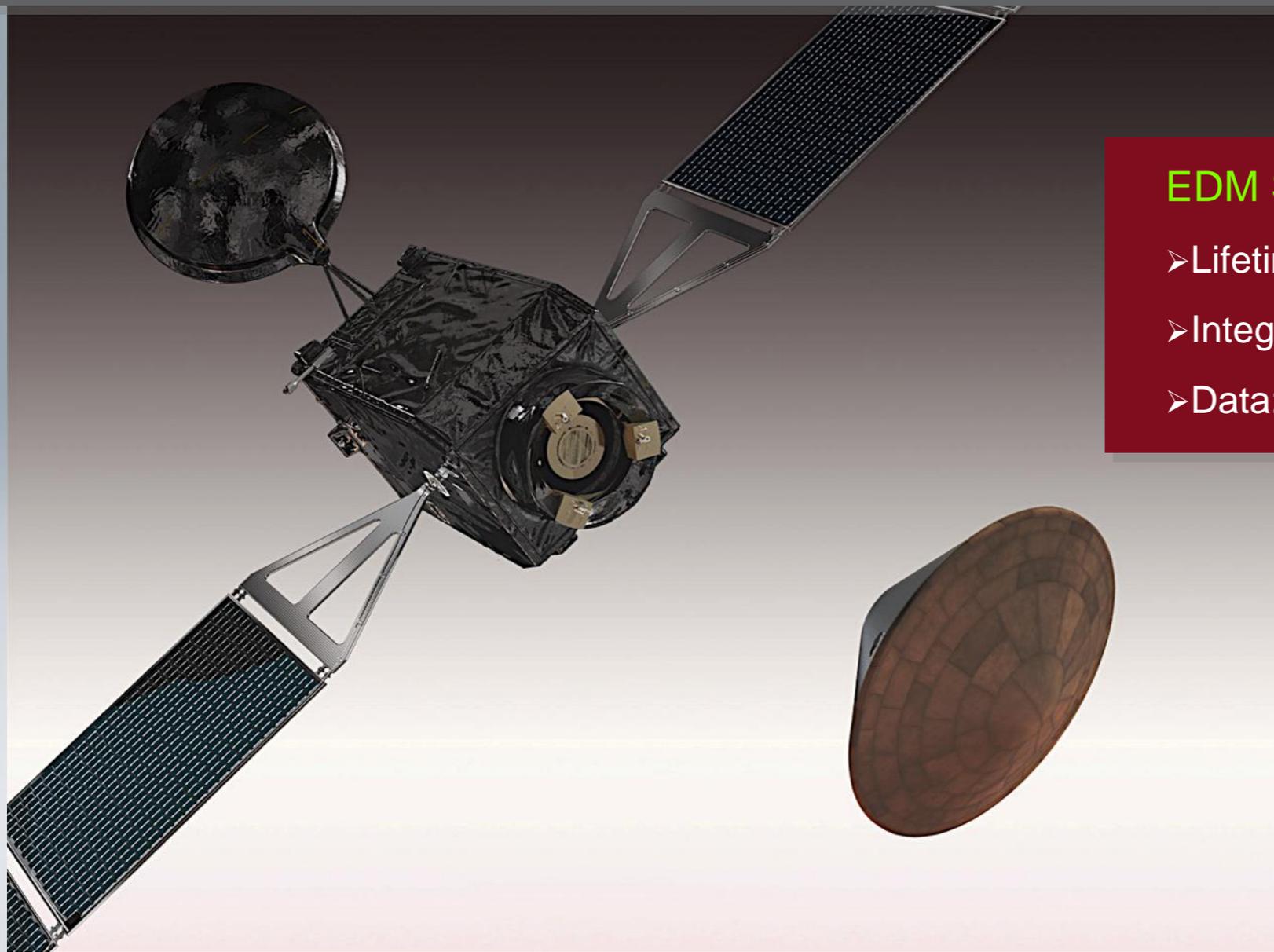


Payload Accommodation



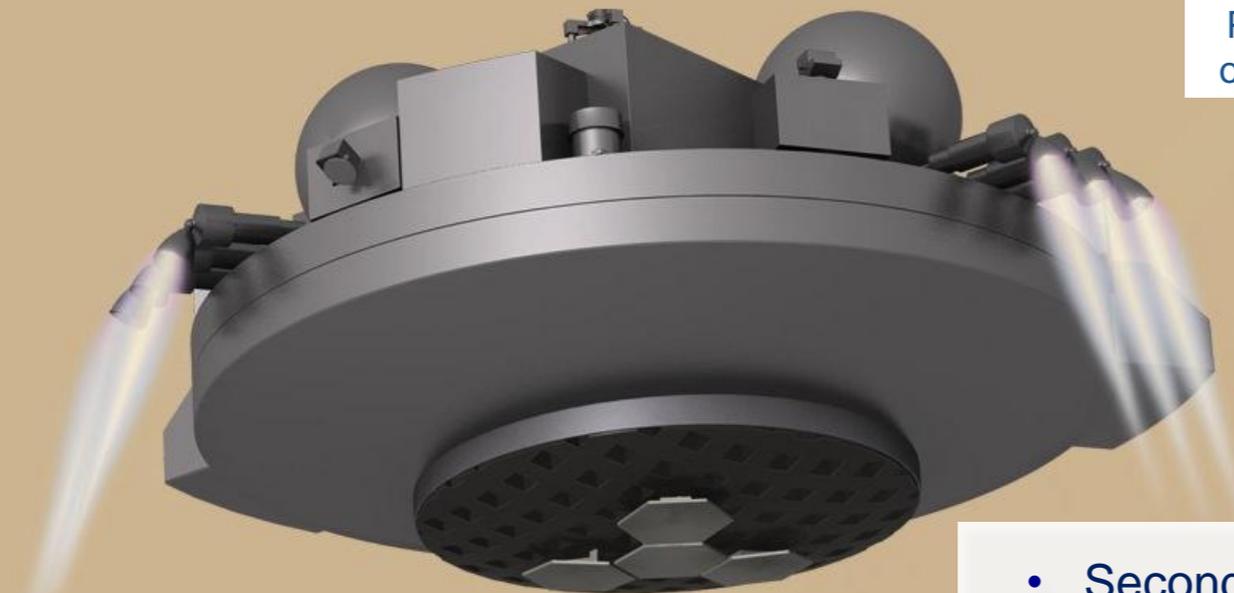
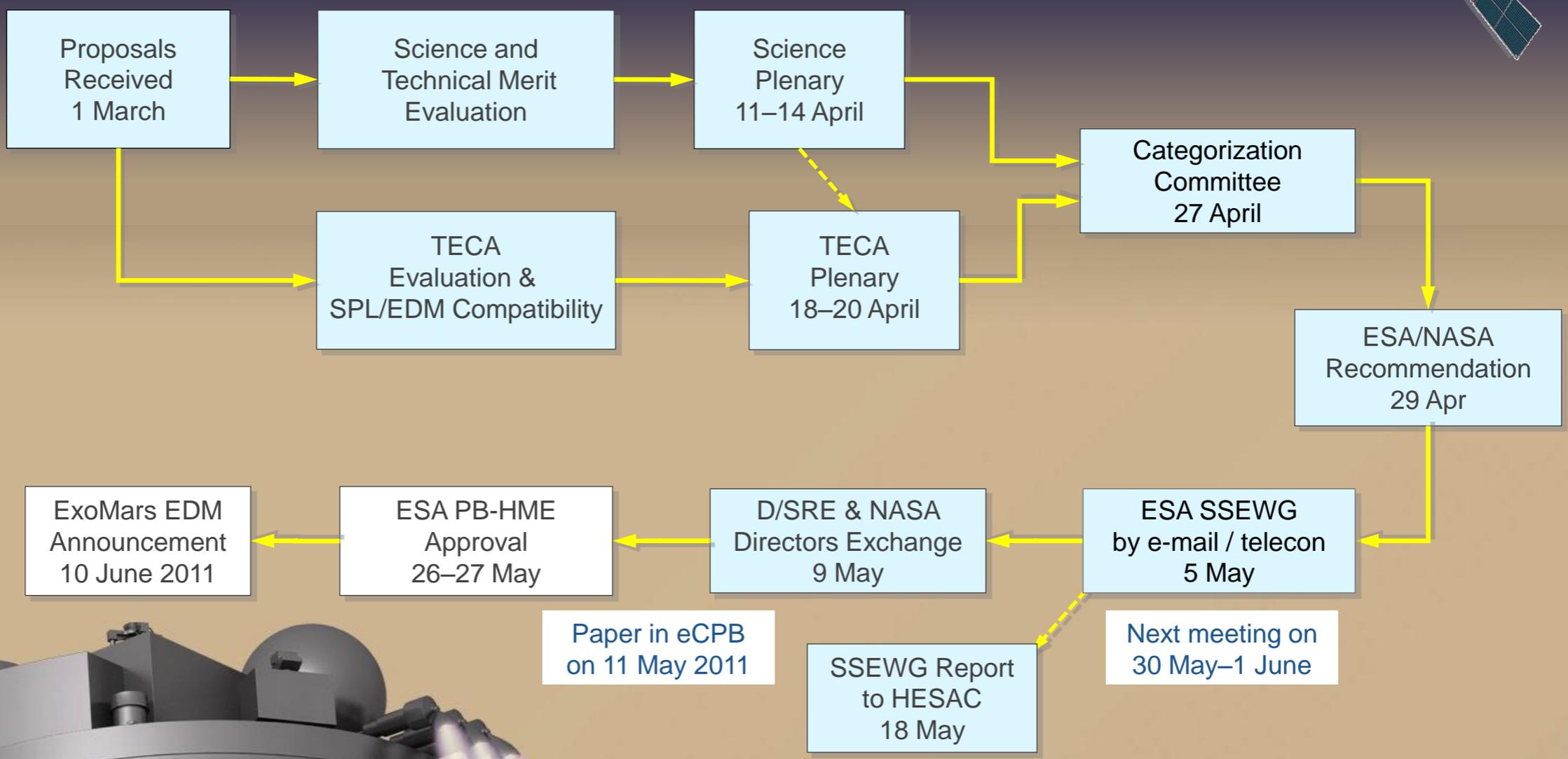
EDM

- A European technology demonstrator for landing medium-large payloads on Mars;
- Provides a limited, but useful means to conduct scientific measurements during the dust storm season.

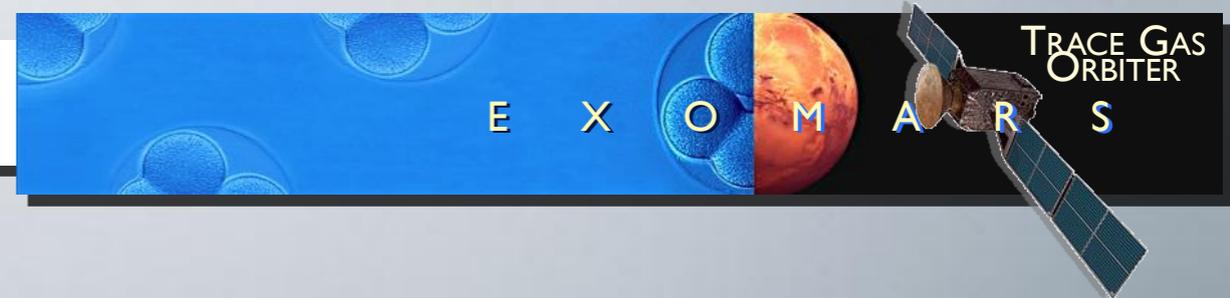


EDM SURFACE PAYLOAD

- Lifetime: 2–4 sols;
- Integrated payload mass: 3 kg;
- Data: single pass of 50 Mbits.



- Second solicitation for proposals jointly organised by ESA and NASA.
- ESA released AO in Nov 2010; 8 proposals received on 1 Mar 2011.
- Both agencies took part in the review process.
- NASA is only supporting US Co-I's in selected proposals.



EDM Surface Payload: DREAMS, including

PI: *Francesca Esposito* *INAF – Osservatorio Astronomico di Capodimonte (I)*
 Co-PI: *Franck Montmessin* *LATMOS (F)*

Wind speed & direction	MetWind	<i>Lead Co-I</i>	<i>Simon Calcutt</i>	<i>University of Oxford (UK)</i>
Humidity	MetHumi	<i>Lead Co-I</i>	<i>Ari-Matti Harri</i>	<i>Finnish Meteorological Inst. (FIN)</i>
Atmospheric pressure	MetBaro	<i>Lead Co-I</i>	<i>Ari-Matti Harri</i>	<i>Finnish Meteorological Inst. (FIN)</i>
Temperature	MarsTem	<i>Lead Co-I</i>	<i>Stefano Debei</i>	<i>Università di Padova (I)</i>
Optical depth	ODS	<i>Lead Co-I</i>	<i>J.-P. Pommereau</i>	<i>LATMOS (F)</i>
Atmospheric charging	MicroARES	<i>Lead Co-I</i>	<i>Franck Montmessin</i>	<i>LATMOS (F)</i>

EDM Entry and Descent Science: Merged proposals EDL Science + Ideas

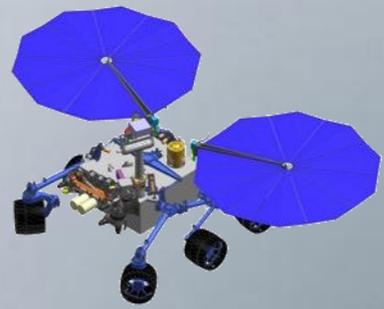
PI: *Francesca Ferri* *Università di Padova (I)*
 Co-PI: *François Forget* *Laboratoire de Météorologie Dynamique (F)*

Surface camera:

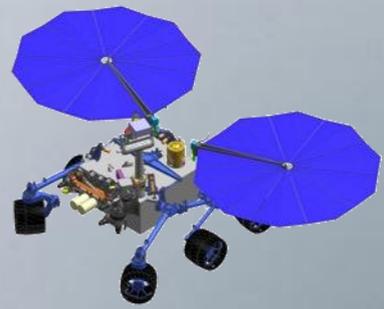
Could not be selected from the submitted proposals.

Various ESA advisory bodies have recommended that a colour surface camera be included in the payload.

The project is investigating options for realising this, possibly in combination with a descent camera.



- After March 2011 Bi-Lat and agreement to study a single, joint rover
 - Joint Engineering and Science Working Groups established
 - JSWG defined initial requirements to address joint sample return and exobiology objectives
 - In situ investigations: Be able to conduct a set of geological and exobiological studies on the surface and subsurface (down to 2-m depth)
 - Returned sample study: Be able to characterize and cache samples of rock, regolith, and atmospheric gas for intended return to Earth
 - JEWG working with JSWG to establish candidate “Threshold” Mission-level requirements
 - Landing site accessibility, mission life, etc., not to exceed MSL-class performance
 - Trade studies and design concept options are the focus of work forward
-
- Working Groups have been meeting by telecon and face-to-face since May to refine concepts and iterate concepts with the Executive Board.



- The Executive Board approved 2 JEWG design concepts in May for further study:
 - Caching and drill on front of rover (Solar and MMRTG variants)
 - Caching and drill on opposite ends of rover (solar powered only)
- Rover work-share is current focus of the Executive Board over the coming months:
 - Hardware/software provisions and roles and responsibilities
 - Cost-based decision making for Agency roles
- Key upcoming milestones:

Key Upcoming Milestones

- Jun 20: Executive Board face-to-face
- Sep '11: PB-HME
- Oct '11: Joint Mars Architecture Review Team (JMART)
- Dec '11: Pre-SRB technical review of concept(s) for MCR
- Dec '11: ESA Council
- 2Q CY12: Mission Concept Review

